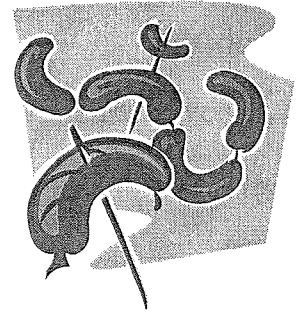


Name:  
Science Class:



# Solar Powered Hot Dog Cooker

**STEM** (Science, Technology, Engineering, and Math) **Content:**

1. Optics: focusing parallel rays of incident light through the use of a parabolic mirror.
2. Energy transformation: light to heat
3. Renewable energy: solar power
4. Design and production
5. Math Formulas: The formula for a parabola is:  $Y = X^2/(4F)$

Where:

X is the horizontal distance from the origin

F is the focal distance (a design choice)

Y is the vertical distance to the curve at any point X

## Problem

How does the time of day impact the cooking time of your hot dog?

\* Each class will collect data during their class time, so data will be collected at 8:30, 9:30, 11:30, 12:30

## Materials Available

plywood  
cardboard  
tin foil (to act as a mirror)  
1/4" wooden dowel with a sharpened point (skewer)  
miscellaneous fasteners and spray adhesive

Tools:

Jig saw  
Power drill  
Drill bits  
Screw driver bits

## Variables

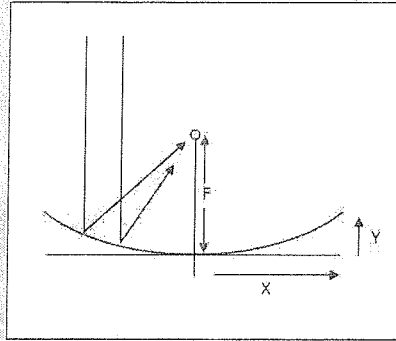
Independent variable \_\_\_\_\_

Dependent variable \_\_\_\_\_

List 4 controlled variables:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

### Background Information: Focusing light with a parabolic mirror



In order to focus parallel rays of incident light on a fixed point you need a parabolic mirror. There are a few different ways to generate a parabolic curve, but the easiest to understand (though not necessarily the easiest in practice) is simply doing the math.

The formula for a parabola is:

$$Y = X^2/(4F)$$

Where:

X is the horizontal distance from the origin

F is the focal distance (a design choice)

Y is the vertical distance to the curve at any point X

#### Design

Use the space below to create the design of your hot dog cooker.

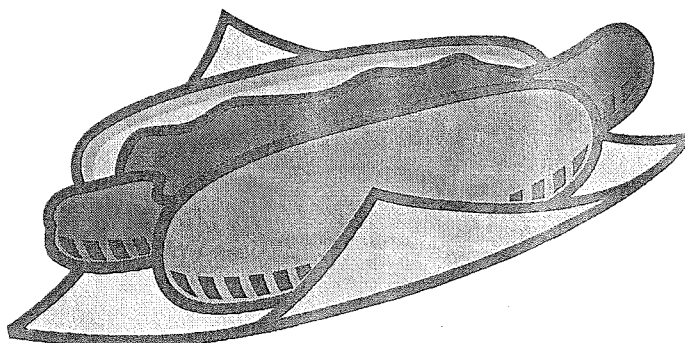
### Procedure

List the steps you use to build your apparatus.

1. \_\_\_\_\_  
\_\_\_\_\_
2. \_\_\_\_\_  
\_\_\_\_\_
3. \_\_\_\_\_  
\_\_\_\_\_
4. \_\_\_\_\_  
\_\_\_\_\_
5. \_\_\_\_\_  
\_\_\_\_\_
6. \_\_\_\_\_  
\_\_\_\_\_
7. \_\_\_\_\_  
\_\_\_\_\_
8. \_\_\_\_\_  
\_\_\_\_\_
9. \_\_\_\_\_  
\_\_\_\_\_
10. \_\_\_\_\_  
\_\_\_\_\_

### Data

On a separate sheet of paper, create a data table to collect data for the hot dog cookers from each class. There will be 6 groups creating the cookers in each of the 4 classes. Data will be collected at 8:30, 9:30, 11:30, and 12:30 (during each class time).



**Analysis & Conclusion**

Answer the following questions in complete sentences and write a Better Answers Conclusion for this experiment.

1. How did the time of day effect the hot dog cook time? Give an explanation.
2. What were some of the different designs for solar powered hot dog cookers you observed from your class mates?
3. How did this experiment connect to STEM? (science, technology, engineering, and math)
4. Give an example of another project you have done (in any class, any grade level) that connected all aspects of STEM. Explain the project or lab and discuss how it connected to STEM.
5. Write a Better Answers conclusion for this lab.